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Joint Modeling Effort between NASA/Goddard/DAO and NCAR/CGDD.

This document outlines the motivation and initial steps of a proposed collaboration between the Data Assimilation Office (DAO) at NASA /Goddard Space Flight Center, and the Climate and Global Dynamics Division (CGDD) at NCAR. The ultimate goal of a successful collaboration would be a unification of global model development with the vision of a common model that can be flexibly configured to meet the specific requirements of the two organizations. This goal needs to be approached in a systematic way that both reveals and reconciles institutional and scientific goals. Therefore, we seek first to obtain funding to determine the feasibility of a productive collaboration, followed by a joint proposal in 1999 to both NASA and NSF.

The motivation for the collaboration is many faceted. Primarily, the DAO has a requirement for a model of recognized excellence in order to provide the best possible assimilated data products to meet its commitment to NASA and the broader community. The proposed collaboration with NCAR recognizes the fact that NASA as an agency and the country as a whole does not have adequate resources for every interested organization to develop independent in-house modeling systems. In particular, there are not deep resources of human talent on which to draw, even if there were larger monetary resources. The collaboration is further motivated and complicated by the challenges of obtaining adequate computing resources to remain internationally competitive.

The DAO sees in NCAR the primary national resource of atmospheric modeling capability, with unparalleled depth and quality in developing physical parameterizations. Furthermore, it is important to have broad ownership by the academic community for the DAO to have a successful data product, and NCAR has engaged the academic community in its modeling activities. NCAR sees an opportunity to more effectively integrate the use of data in climate model development, as well as particular interest in some components of the DAO model.

In 1997, Richard Rood from the DAO and David Williamson from NCAR explored the difficulties of intercenter and interagency collaborations and what was needed for science collaborations to lead to fruitful partnerships. The following characteristics were identified as necessary for a successful collaboration.

- ... There must be stable vision and strategic goals.
- ... Both sides must have interest and uncommon diligence at the management level.
- ... Both sides must have interest at the working level.
- ... Both sides must provide an intellectual resource.
- ... Both sides must have a stake in the product.

... Both sides must perceive value in the product.

... There must be an alignment of individual reward systems of the organizations with the success of the collaboration.

With these principles in mind, the DAO provided funding from its EOS budget for two scientists dedicated fully to the joint effort, and NCAR provided earnest participation of two scientists. Initial steps and controlled experiments were designed to combine the NCAR physics with the Lin and Rood (1997) dynamics. The short-term goal was to identify any showstoppers and do an initial examination of computational issues. The longer-term goal was to address the more difficult issues of a productive collaboration to unify model development. Presently a running model exists that has produced a number of five-year control experiments. Initial diagnosis suggests that there are no showstoppers; however, a number of key issues must yet be addressed.

We propose now to take the next step in advancing this collaboration. If the collaboration is to be successful then there must be very careful planning of the effort and the scope must be limited to the point that the tasks can be reasonably defined. Such a plan is difficult to generate from first principles and the collaboration itself needs to serve as a prototype to develop the details. Such prototyping requires people to work on the problem with goals in two distinct categories:

- 1) continued scientific scrutiny and development of the initial successes
- 2) development of a proposal that defines the attributes of the collaboration

This proposal would be jointly written by the two organizations and would stand as a contract between the two organizations and the funding agencies. In addition to defining and refining the scientific aspects of the collaboration, the proposal would

... Expose motivating factors of the two organizations
o Define a process for reconciling conflicting requirements of the two organizations

... Define a product

... Define a process for model development

... Define rules for validation

... Develop the software engineering standards and requirements for the two organizations

The activities to date have all been undertaken with the intent of addressing the characteristics of successful collaborations described above. There has been support from the immediate supervisors (Franco Einaudi and Maurice Blackmon) of the science organizations involved in the collaboration. For the collaboration to advance further there needs to be a higher level of commitment from the two funding organizations,

NASA and NSF. In addition the collaboration needs to obtain broader institutional support with recognition that the top-level management of the two centers stand behind the success of the collaboration. In order to move towards the goal of writing a joint proposal as described above we therefore seek

- 1) Funding to advance the vision outlined in this document towards the goal of unifying global model development between DAO and CGDD.
- 2) A memo of understanding between the funding managers of the two agencies and the science managers of the two centers expressing the intent to support the goals of this document.